Executive Overview

Software Productivity

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About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs.

Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

Offices

NORTH AMERICA

Headquarters
1943 Landings Drive
Mountain View, CA 94043
(415) 960-3990
Telex 171407

New York
Parsippany Place Corp. Center
Suite 201
959 Route 46 East
Parsippany, NJ 07054
(201) 299-6999
Telex 134630

Washington, D.C.
8298 C, Old Courthouse Rd.
Vienna, VA 22180
(703) 847-6870

EUROPE

United Kingdom
INPUT
41 Dover Street
London W1X 3RB
England
01-493-9335
Telex 27113

Italy
Nomos Sistema SRL
20124 Milano
Viale Vittorio Veneto 6
Italy
228140 and 225151
Telex 321137

Sweden
Athena Konsult AB
Box 22232
S-104 22 Stockholm
Sweden
08-542025
Telex 17041

ASIA

Japan
ODS Corporation
Dai-ni Kuyo Bldg.
5-10-2, Minami-Aoyama
Minato-ku,
Tokyo 107
Japan
(03) 400-7090
Telex 26487

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Planning Services For Management

To Our Clients:

This summary is an excerpt from a full research report, Software Productivity, issued as part of INPUT's Information Systems Program (ISP). A complete description of the program is provided at the end of this Executive Overview.

If you have questions or comments about this report, please call INPUT at (415) 960-3990 and ask for the Client Hotline.

REPORT ABSTRACT

Systems development productivity tools, ranging from applications development tools, software maintenance tools, and fourth/fifth generation languages to data base management systems, have been and continue to be developed. The quality, variety, and use of such tools have all increased over the past five years, but there is serious doubt as to whether hardware/software performance has improved.

This is primarily due to two things: productivity is only being targeted at the code/language/data base level rather than at the systems level, and little or no attention is being paid to the quality and use of information, e.g., the emphasis is on code and data production rates rather than whether the data is useful or the code is efficient.

OVERVIEW CONTENTS

A. SOLUTIONS—A COMMUNICATIONS GAP

- The solutions to the productivity problem are quite different for the development staff and for end users.

  - The development staff has traditionally depended on computer lanuages and data base management systems to improve productivity in developing computer applications. Currently, the emphasis is on 4GLs and relational DBMSs.

  - The primary productivity tools of end users are word processing packages and spreadsheets. While DBMSs are included in integrated packages, users do not utilize them for any significant portion of their work. The impact of user productivity tools has primarily been on calculators and typewriters.

- The major problem continues to be a significant communications gap between the development staff and end users. The development staff feels the end users do not understand the complexity of what they are asking for and in any case must be controlled by standards, access hierarchies, and security, while the end users ask only for data so they can do what they want with it. There is a major conflict between top-down versus bottom-up systems design, and there is chaos in computer/communications networking, especially at the departmental level.

- It appears apparent that there is currently little reason to believe that the central development staff with its large mainframe orientation and the end users with their PCs are developing applications which can be effectively integrated into systems that will be of maximum benefit to their common company or organization.

SOLUTIONS - A COMMUNICATIONS GAP

	DEVELOPMENT STAFF	END USERS
Productivity Tools Required	• 4GLs • Relational DBMS • Etc.	• Word Processing • Spread-sheets • Etc.
Design Approach	Top-Down	Bottom-Up
Need	Control	Data

B. UPSIDE DOWN

- Past INPUT research into productivity has indicated that, in order to have a truly productive environment for developing systems, it is necessary to establish the following priority sequence:

  - One, there must be a commitment to quality.

  - Two, end users must be involved in the development process.

  - Three, there must be broadbased management of development projects.

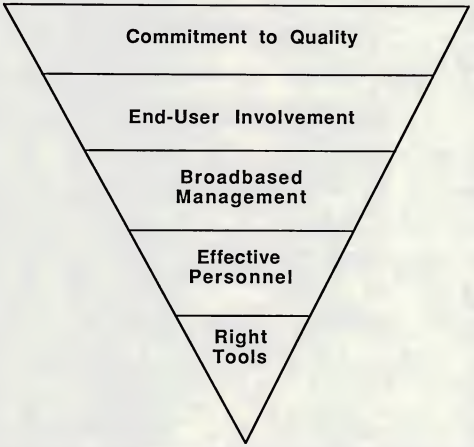
  - Four, effective personnel must be assigned to the project.

  - Five, the right tools must be selected based on both the nature of the project and the personnel who have been assigned.

- Past research disclosed (and current research confirms) that primary emphasis is being placed on tools and little attention is being given to quality. The "productivity pyramid" has been turned upside down by the "distributed systems development" environment which has been created by the use of PCs, micro/mainframe links, information centers, prototyping, and the general confusion concerning networking and "connectivity."

- The typical "solutions" attempted therefore contribute to the problem in this topsy-turvy environment. They are essentially short-term solutions with long-term impacts, which do not focus on either quality or end-user involvement and which ultimately add to the list of long-term concerns to be resolved.

THE PRODUCTIVITY PYRAMID 1980



C. BACKWARDS

- Besides being "upside down" in our approach to productivity improvement, there are those who believe that we are going about computer/communications network development "backwards."

- A prominent computer industry executive has been quoted as stating that we have been literally going about networking backwards by "buying a lot of computers and then trying to tie them together." The solution recommended was to "build the network first and hang the computers on later."

- This type of reasoning fundamentally says that rather than concentrating on standalone and/or loosely coupled data processing applications, the emphasis should be on information flow between and among humans, organizations, and computers. It is difficult to argue with this bit of wisdom, and one of the case study companies in this study seems to have had substantial success by concentrating on network development and worrying about specific applications later.

- This type of approach is foreign to most central IS departments which are large mainframe, central data base-oriented in their approach to systems development. Going about network development in a straightforward manner has not been characteristic of either vendors or those responsible for computer systems development.

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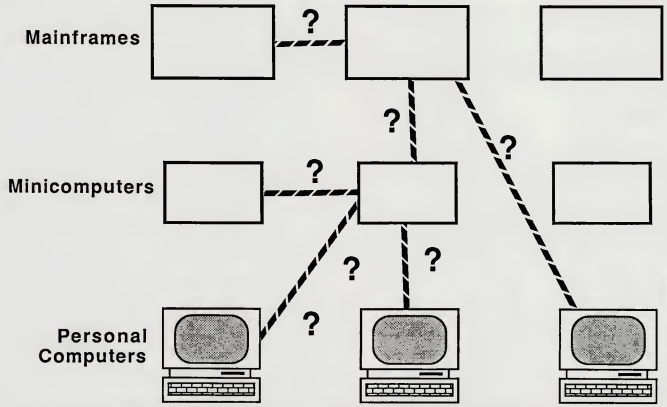
BACKWARDS COMPUTER/COMMUNICATIONS NETWORKS



D. PRODUCTIVITY/PERFORMANCE/PROBLEMS

- INPUT believes that true productivity (either of the enterprise or in the systems development process) must be measured by performance at four levels:

  - The hardware/software level which includes the cost of all hardware and software on both an investment and ongoing (operational) basis and the throughput of the system in terms of productive work.

  - The human/machine dyad which measures the combined cost of the human and machine and the resulting output the dyad is able to achieve.

  - The work unit, an organizational (rather than geographic) entity, which includes the cost of interpersonal communications and overhead activities.

  - The institutional level which can be the classic "bottom line" or other suitable measure of achieving goals and objectives in a cost-effective manner.

- These levels are interrelated, but maximization at one level does not necessarily have positive impact on the other. (For example, lines of code or quantity of paper produced at the human/machine dyad may or may not have positive impacts on the other performance levels.)

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PRODUCTIVITY/PERFORMANCE/PROBLEMS

	PERFORMANCE LEVEL	IMPACT OF TOOLS
I	Hardware/Software	Negative
II	Human/Machine	Positive
III	Work Unit	Negative
IV	Institutional	Unclear

E. PRODUCTIVITY PLAN

- It is INPUT's conclusion that the IS function needs a productivity plan which rights the productivity pyramid by establishing priorities that emphasize quality and performance at all four performance levels. The answer to improved productivity is not throwing more hardware and software at business problems and assuming that computerized solutions are the total answer. Quick and dirty systems development in order to meet schedules and turn projects over for maintenance are counterproductive.

- It is necessary to get end users involved during all phases of the systems life cycle for all major projects and not view end-user computing as a convenient way of keeping down end-user demands while the development teams work on the really important projects. The active participation of both user and executive management in all phases of major development projects should be encouraged, and both end users and management should share the commitment to quality which is the foundation of any productivity improvement plan.

- The attraction, motivation, management, and retention of effective personnel should be of primary concern. Most competent IS management recognizes that throwing bodies at productivity problems is counterproductive and can actually take longer and produce inferior systems. The temptation to constantly grow the organization is not necessarily an integral part of a good productivity plan.

- The right tools to establish a truly productive environment become secondary if attention is given to the more fundamental aspects of a productivity improvement program. There is no shortage of good tools, but the quest for a magical solution to the entire productivity problem can result in substantial wasted effort.

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PRODUCTIVITY PLAN

- Establish Priorities Emphasizing Quality and Performance
- Active Executive Management and End-User Involvement
- Motivation, Management, and Retention of Effective Personnel
- Right Tools Secondary

F. REQUIREMENTS BY PERFORMANCE LEVEL

- The IS department must concern itself more with the use and quality of data and information at the various performance levels which contribute to a productive environment. At the hardware/software level, more attention must be given to performance monitoring and the impact of the tools used to develop systems on the operational characteristics of those systems. The IS function must accept responsibility for establishing a productive hardware/software environment and not become overly dependent on the current solutions provided by outside vendors.

- At the human/machine dyad level, the IS function has a responsibility to provide education and training in the effective use of the tools chosen. The first thing which will be necessary is to convince PC users that their PC tools are not "applications" and that there are elements of both programming and data base management disciplines which must be applied when using them.

- At the work unit level, IS must become familiar with the company flow of information (mostly paper systems and procedures) and help users understand the quality of the data and information they receive from the central computer facility. IS must provide leadership in educating work units on systems concepts and in the major technological change from paper to electronic media.

- At the institutional level, data, information, and knowledge must be understood and qualified in terms of content, integrity, and use. The ability to recognize the difference between information and knowledge is of primary importance. Before building knowledge-based systems, it is necessary to identify knowledgeable people.

REQUIREMENTS BY PERFORMANCE LEVEL

• Hardware/Software	- Performance Monitoring - Privacy and Security - Environment Productive Hardware/Software
• Human/Machine Dyad	- Education and Training - Programming and Systems Concepts
• Work Unit	- Quality Control Systems - Systems Concepts - Media Replacement (Paper ⟶ Electronic)
• Institutional	- Data/Information/Knowledge Content, Integrity, and Flexibility - Knowledge Identification

G. RECOMMENDED CHANGES OF DIRECTION

- INPUT recommends that the IS function broaden the scope of its vision and activities.

  - Emphasis must be shifted from data processing (computer) applications to information flow within the organization.

  - Productivity must be measured not by the quantity of data/information produced but by the quality.

  - Rather than automate current office processes, the processes themselves must be improved and better understood.

  - Gradually, the emphasis on information must give way to the identification of knowledge and the information which is necessary to improve and create new knowledge.

  - The IS function must change from being application builders to becoming data/information/knowledge architects (which is another way of saying that systems personnel must understand the business they are in).

  - The whole purpose of computer systems is to improve productivity, and the systems developers must become productivity consultants to management in the broadest sense of the term; in other words, at all four performance levels.

RECOMMENDED CHANGES OF DIRECTION

- Data Processing Applications → Information Flow
- Information Quantity → Information Quality
- Automation of Process → Improved Process
- Information Emphasis → Knowledge Emphasis
- Application Builders → D/I/K Architects
- Systems Developers → Productivity Consultants

SOFTWARE PRODUCTIVITY

CONTENTS

EXHIBITS

INFORMATION SYSTEMS PROGRAM (ISP)

ISP: Meeting The Challenges of Today's IS Role

INPUT's Information Systems Program (ISP) helps IS executives to meet the strategic, tactical and operational challenges faced in today's and tomorrow's information systems environment:

Strategic	√	Cost Containment
	√	Government Deregulation
	√	Non-Traditional Competitors
Tactical	√	Cost Containment
	√	Information Delivery
	√	Integrating IS and Corporate Planning
Operational	√	Improving Productivity
	√	Cost Containment
	√	Improving Information Delivery

ISP is a comprehensive program of research-based studies, informative client meetings, and continuous support services. ISP is simple, affordable and effective.

Continuous Services

...Strategic Issue Studies

You will receive six Strategic Issue Studies conducted by INPUT in 1986. The studies address user requirements, buying patterns, IS organization expenditures now and in future, case studies and more. Topics of research for 1986 are:

- IBM Operating Systems Strategies
- Network Services Directions
- Distributed Processing Services
- Departmental Software
- Distributed Processing Services: The New Telecomputing Environment
- Software Productivity/Applications Development (tentative topic)
- Systems Integration (tentative topic)

INPUT's Strategic Issue Studies provide the customized information you need, at a fraction of the cost of proprietary research.

...IS Executive Meetings

INPUT will conduct informative one-day seminars in conjunction with each Strategic Issue Study you select. Find out at these valuable meetings how other IS executives are meeting today's challenges, and how they are gearing up for tomorrows. For your convenience, INPUT will hold meetings on both the east and west coasts of the U.S.

The one-to-one exchange of experiences and information with your peers provided by INPUT's IS Executive Meetings allow you to make decisions based on reality -- not industry hype.

...IS Industry-Sector Analysis and Forecast

This "reference study" is crucial to successful IS budgeting and planning. Based on a multitude of interviews with key educational IS organizations as well as eight other industry sectors, INPUT will present hard data on IS spending, budgets, and more. With this study you will know -- on an industry-by-industry basis:

- Forces driving IS direction, issues, objectives
- Top management perception of IS and organizational issues
- Impact of future technology
- IS role in end-user computing (equipment acquisition, software development, training, maintenance, security)
- New applications
- IS' corporate contribution
- Distribution of corporate computing expenses (distributed vs. central vs. end-user)
- Budget distribution (personnel, hardware, computer services, communications, software, maintenance)
- And more!

INPUT's IS Industry-Sector Analysis and Forecast is the baseline of sound IS budgets and plans.

...IS Client Hotline: Continuous Planning Support

INPUT's senior Information Systems consultants, knowledgeable about the issues and challenges that face IS managers and planners, are available to you each and every day. Answers to your IS questions or a discussion about current industry events that may impact your firm are as close as your telephone.

For planning support whenever you need it, simply call any of INPUT's three U.S. research offices (California, New Jersey or Washington, D.C.). In addition, all clients have direct access to INPUT's ISP consultants via voicemail. Through this effective service, clients can pose questions at anytime during the day or night and receive rapid response.

INPUT's IS Client Hotline provides the exact information you need, when you need it.

...The Information Center

INPUT maintains information on more than 4,000 information industry vendor's products and services, more than 300 industry/application files, and subscribes to more than 140 different industry publications through its Information Center. This valuable resource is available to all clients through direct use or through the IS Client Hotline.

INPUT's Information Center -- tracking the development and growth of the information industry for more than a decade, providing up-to-the-minute information on technology, monitoring the performance of both IS and vendor organizations -- provides the facts-based foundation you need for effective planning.

STANDARD DELIVERY

As a client you will receive up to two copies of all reports, materials and services described above for twelve consecutive months. You may send up to four attendees to each IS Executive Meeting; attendees will each receive a hardcopy of presentation materials.

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In addition to standard services described above, you may select either or both of the optional services defined below:

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This set of three reports details IBM's actions in the large system market and responses by other vendors in the marketplace. Residual value forecasts for IBM and selected IBM-compatible mainframes are included. Also coveredare storage devices, printers and other peripherals.

... On-Site Presentation

During the final three months of your subscription period, INPUT's senior IS consultants will present to you and your staff (at your site), the results of all IS-related research conducted by INPUT during your subscription period. The presentation and discussion following clarifies the real impact that industry events and trends will have on your firm.

For more information, contact your nearest INPUT office listed on the next page.